REMARKS

In the Office Action, Claims 20 and 23 to 26 were rejected under 35 U.S.C. § 101. The rejections are traversed.

In this regard, the Office Action asserts that each of the claimed steps "can be done by software/program, does not define a 'hardware/apparatus' and is thus non-statutory for that reasons, **recalling *In re Bilski.***" Applicant wholly disagrees with this assertion. In particular, each of the claimed steps recites a step of performing some function (e.g., "a bit connection step of connecting a decimal portion of image data ..."). Software/program is merely static code recorded on some type of memory medium (e.g., HDD, CD-ROM, etc.) and can perform no function whatsoever by itself. That is, the software code, in order to actually perform the claimed functions, must necessarily be loaded from the memory medium into a CPU, where it can then be executed by the CPU and other computer hardware components to actually perform the claimed function. Therefore, it would be an absurd interpretation of the claims to simply state that they constitute software. Rather, if the claimed process is to be interpreted as comprising software as one component for performing the claimed process, hardware must also necessarily be involved and therefore, the claims are statutory. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

Claims 1, 3, 7, 20, 22, 26 and 29 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,488,673 (Katayama) in view of U.S. Patent No. 6,330,075 (Ishikawa), and Claims 4 to 6 and 23 to 25 were rejected under § 103(a) over Katayama in view of Ishikawa and further in view of U.S. Patent No. 6,977,756 (Nakano). These

rejections are also traversed and the Examiner is requested to reconsider and withdraw the rejections in light of the following comments.

The claims form bit-connected image data having an integer portion of image data of a target pixel and a decimal portion of image data of a preceding pixel, and then corrected image data is generated. During quantization, the integer portion of the corrected image data is received without receiving the decimal portion so that only the integral portion of corrected image data is quantized. A correction value to be diffused to neighboring pixels is generated, where the correction value to be added is generated from quantized errors of pixels neighboring the target pixel and diffusion components smaller than 1.0. The foregoing will now be explained in more detail with regard to Fig. 1.

Generally, the claims include the following components and their output:

Component	Output
bit connection component (bit connecting circuit 1)	integer and decimal portions
correction component (2)	integer and decimal portions
latch component (latch 3)	only decimal portion
quantization component (quantizer 4)	integer portion
inverse quanitizing component (inverse quantizer 5)	integer portion
calculation component (6)	integer portion
buffer (buffer 8)	integer portion
error diffusion component (diffusion filter 9)	integer and decimal portions, and sign

The reason of arising the decimal portion in the claimed inventions is that the diffusion coefficients is smaller than 1.0. This has been emphasized in the wherein clause of the claim 1: "wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0". Thus, the output being applied with the diffusion coefficients becomes both the integer and decimal portions. According to the invention, the decimal portion of the integer and decimal portions is split off in front of the quantization component ("a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel"). According to the claimed invention, the buffer maintains the quantization error which does not include a decimal portion so as to reduce the memory capacity requirement of the buffer. The reason why the quantization error is only made from an integer is that the decimal portion of the integer and decimal portions is split off in front of the quantization component. Generally, the split off of the decimal portion introduces lowering of the calculation accuracy. To improve the calculation accuracy, the decimal portion is added to a next pixel ("a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel; a latch component that latches a decimal portion of the corrected image data of the target pixel to

be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel"). These claim elements contribute to reduce the memory capacity requirement of the buffer and to limit the reduction of the calculation accuracy.

Referring specifically to the claims, independent Claim 1 is directed to an image processing apparatus comprising a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel, a correction component that generates corrected image data of the target pixel by adding a correction value to the bit-connected image data of the target pixel, a latch component that latches a decimal portion of the corrected image data of the target pixel to be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel, a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel, an inverse quantizing component that inverse-quantizes the quantized integer portion of the corrected image data of the target pixel, and outputs an inverse-quantized data of the target pixel, a calculation component that outputs a quantization error of the target pixel based on a difference between the integer portion of the corrected image data of the target pixel and the inverse-quantized data of the target pixel, a buffer that stores the calculated quantization error, and

an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer, wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

Claims 20 and 39 are method and computer medium claims, respectively, that substantially correspond to Claim 1.

The applied art, alone or in any permissible combination, is not seen to disclose or to suggest the features of Claims 1, 20 and 39, and in particular, is not seen to disclose or to suggest at least the features of i) a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel, ii) a latch component that latches a decimal portion of the corrected image data of the target pixel to be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel, iii) a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel, and iv) an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer, wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization

errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

Katayama is seen to teach that an arithmetic-error computing means 905 calculates arithmetic-error given by the integer calculation of the error-to-be-distributed computing means. Katayama distributes both of the error of integer portion and the arithmetic-error to adjacent pixels. Referring to Fig. 25 of Katayama, the various components and their outputs can be seen as follows:

Component	Output
Image inputting means 901	only integer portion
Data adding means 902	Integer and decimal portions
binarizing means 903	Only integer portion
error-to-be distributed computing means 904	Integer and decimal portions, and sign
arithmetic error computing means 905	integer and decimal portions
arithmetic distributing means 906	integer and decimal portions
error distributing means 907	integer portion
error storing means 908	integer and decimal portions

From the foregoing, it can be seen that Katayama is different from the claims,a nd in particular, the feature of splitting off the decimal portion in front of the quantization component is neither taught nor suggested by Katayama. Accordingly, Katayama is not seen to teach the features of i) a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected

image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel, ii) a latch component that latches a decimal portion of the corrected image data of the target pixel to be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel, iii) a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel, and iv) an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer, wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0. Accordingly, Claims 1, 20 and 39 are believed to be allowable over Katayama.

Ishikawa discloses generating a dot pattern from a LUT (Look Up Table), where an error in the input pixel data is obtained and diffused to surrounding pixels. Ishikawa also implements an inverse quanizer. However, Ishikawa does not teach anything that, when combined with Katayama, would have resulted in the features of i) a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel, ii) a latch component that latches a decimal portion of the corrected image data of the target pixel to be

connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel, iii) a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel, and iv) an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer, wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

Nakano is not seen to teach anything to overcome the deficiencies of Katayama and Ishikawa. Nakano discloses that a data driven type processing device has an error diffusion computing unit built therein. An error holding register is provided within the error diffusion-computing unit, and is used to successively store and update a value of error information of a pixel that is to be diffused to a neighboring pixel being processed continuously. An error data memory is provided outside the computing unit, and is used to store and update a value of the error information that is to be diffused to another neighboring pixel being processed discontinuously. The error information and the values to be diffused are stored in a packet, and the packet is circulated for operation. However, Nakano is not seen to disclose or to suggest anything that, when combined with Katayama and/or Ishikawa, would have resulted in at least the features of i) a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-

connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel, ii) a latch component that latches a decimal portion of the corrected image data of the target pixel to be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel, iii) a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel, and iv) an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer, wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

In view of the foregoing amendments and remarks, amended independent Claims 1, 20 and 39, as well as the claims dependent therefrom, are believed to be allowable.

No other matters having been raised, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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